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Highway Extension and Research Project for
Indiana Counties and Cities

PAVEMENT CUTS FOR UTILITIES: A GUIDE FOR THEIR MANAGEMENT

J. M. Iddins and C. F. Scholer

October 1984
Publication No. H-84-6

Purdue University—School of Civil Engineering
in cooperation with
Indiana Department of Highways
Indiana Association of County Commissioners
Indiana Association of Cities and Towns
Federal Highway Administration

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INTRODUCTION

The conditions of our city and county streets are of increasing interest to the motoring public. The public is paying more fuel tax, but receiving less in terms of smooth-riding quality roads. In fact, the rough-riding surface causes the motoring and bicycling public to spend thousands of dollars each year for front-end alignments and other repair work on their automobiles, trucks and bikes. The public is turning to local city and county governments and for answers about the poor road conditions.

Even with increased fuel taxes, city and county officials must maintain their roads and streets with low budgets and few personnel. The reason for this is that the majority of local public agency budget increases must go to salary increases, and fixed costs such as increased insurance, fuel and equipment. Therefore, actual working funds remain at low levels. The low budgets force city and county engineers to cut back on important programs like street cut repair control. Street cuts are becoming a major problem because utility contractors are often not sufficiently controlled by utility, city and county officials. Some contractors, and local government work crews have taken advantage of the lack of control by repairing the street cuts improperly. As a result of this practice, many street cut repairs fail.

Street cuts are made by a variety of organizations. While some utilities make their own street cuts, most large utilities subcontract their repairs to local general contractors. Many cities own utilities, such as a water company. The Public Works Departments in these cities handle all street cuts for the city-owned utilities. Plumbers may be contacted by homeowners to connect their homes to city water mains. Thus,even plumbers are involved in making street cuts. No matter who owns the utilities or who does the work, the same standards should apply. In this document, contractors, plumbers and utilities making street cuts will be referred to as "utility contractors."

This manual was written to show the methods which work well for several states, counties and cities. The purpose of this manual is not to have every city and county rewrite and reorganize their entire street cut program. The cities and counties with incomplete programs may improve or round out their programs. The contents of this manual should not be used as specifications, but as a guide to develop a set of specifications and procedures. The research for this manual was conducted through personal interviews, telephone calls and letters to state, county, city and utility engineers. States were contacted because cities and counties usually develop their material from state specifications. The State Highway Departments or Departments of Transportation of Indiana, Kentucky, Tennessee, Michigan, Illinois and Ohio were contacted. The Indiana city engineers of Indianapolis, Valparaiso, Kendallville, West Lafayette, Lafayette, Bedford, and Alexandria were contacted. Only one county engineer was contacted because most street cuts are made in cities.

SPECIFICATIONS AND PROCEDURES

Procedures for utility contractors to follow when making road cuts have been developed by most cities and counties within Indiana. These procedures vary greatly from city to city or county and county. This chapter is designed to aid in the development or improvement of specific procedures. The whole object is to provide citizens the most service for their tax dollars. These guidelines were developed by consultation with several state highway departments and county and city engineers.

The main points of detailed policies and procedures are listed below. Each is then briefly discussed.

- Performance Bond
- Permit
- Specifications
- Inspection Procedures
- Emergency Procedure
- Penalties

Performance Bonds

Surety (performance) bonds should be required for utility work and occupancy on city or county roads. The bonds are intended primarily to guarantee prompt and satisfactory replacement and repair of facilities that may be damaged or disrupted by the utility contractor's operations. The amount of the performance bond varies among local governments. One method of determining the amount is to set a flat rate, a minimum of $2,500 (1981 figure). The other method is to have the monetary value of the bond based on the potential for road damages.

The bond should remain in force until the work complies with standards, and all permit matters are complete to the satisfaction of the engineer (inspector). The normal period to hold a performance bond is one to two years. The bond should not be released until the repair is reinspected. Examples of standard performance bonds are presented on the next page. Most cities consulted require the utilities to maintain a standing performance bond. Therefore, one is not needed for each cut. [1]

S U R E T Y B O N D
(For Utility Permits)

KNOW ALL MEN BY THESE PRESENTS:

That we _____, PRINCIPAL, and _____ as SURETY, are held and firmly bound unto the DEPARTMENT OF TRANSPORTATION, Bureau of Highways, of the State of Tennessee to perform the work described in the Application and Utility Use and Occupancy Agreement attached hereto and requested this the _____ day of _____, 19_____, in the manner prescribed in said Application and Agreement and to replace or repair any portion of pavement, shoulders, bridges or any other part of the highway described in said Agreement which may be damaged as a result of the work hereinbefore referred to. We do hereby agree to repair or replace any damaged portion of said highway in accordance with the Standard Specifications for Road and Bridge Construction of the Department of Transportation, Bureau of Highways, of the State of Tennessee. In the event such repairs or replacements are not made in a manner satisfactory to the Department of Transportation, Bureau of Highways, of the State of Tennessee, we hereby agree to reimburse said Department of the cost of such repairs.

We do bind ourselves in the sum of $_____ for a term beginning the _____ day of _____, 19____, until proper ease is received from the Department of Transportation, Bureau of Highways, of the State of Tennessee.

NOW, THEREFORE, the PRINCIPAL AND SURETY assume all obligations and liabilities as set forth above.

SIGNED, SEALED and dated this the _____ day of _____, 19_____.

_____
PRINCIPAL

BY _____

_____
TITLE

_____
SURETY

BY _____

Surety Company Bond No. _____

Mailing Address of Surety Company

_____
_____

Name and Address of Agency Writing Bond

_____
_____

(A copy of the Power of Attorney properly executed by the company authorizing the Agent signing above to bind the company as Surety on this Bond must be attached hereto.)

R U N N I N G S U R E T Y B O N D
(For Utility Permits)

WHEREAS, it will be necessary, from time to time for _____ to locate utilities on and to perform work on State Highway rights of way within the City County (strike one) of _____, Tennessee, after applying for and being granted an Application and Utility Use and Occupancy Agreement with the Department of Transportation, Bureau of Highways, of the State of Tennessee for each such installation and,

WHEREAS, in consideration of the entering into Application and Utility Use and Occupancy Agreements by the Department of Transportation, Bureau of Highways, of the State of Tennessee, _____, agrees to insure to the said Department that it will repair or replace any portion of pavement, shoulders, bridges or any other part of any highway which may be damaged as a result of the work hereinbefore referred to,

NOW, THEREFORE, KNOW ALL MEN BY THESE PRESENTS:

That we, _____, as PRINCIPAL, and _____, as SURETY, are held and firmly bound unto the Department of Transportation, Bureau of Highways, of the State of Tennessee to perform any work within City County (strike one) of _____, Tennessee, permitted in any Application and Utility Use and Occupancy Agreement between _____ and the Department of Transportation, Bureau of Highways, of the State of Tennessee, applied for and granted after the _____ day of _____, 19___, in the manner prescribed in each of said respective agreements and to replace or repair any portions of pavement, shoulders, bridges or any other part of the highway described in said respective agreements which may be damaged as a result of the work hereinbefore referred to. We do hereby agree to repair or replace the damaged portions of said highways in accordance with the Standard Specifications for Road and Bridge Construction of the Department of Transportation, Bureau of Highways, of the State of Tennessee. In the event such repairs or replacements are not made in a manner satisfactory to the Department of Transportation, Bureau of Highways, of the State of Tennessee, we hereby agree to reimburse the Department of Transportation, Bureau of Highways for the costs of such repairs.

We do bind ourselves in the sum of $_____ until proper release is received from the Department of Transportation, Bureau of Highways, of the State of Tennessee for each installation for which an Application and Utility Use and Occupancy Agreement was entered into between _____ and said Department from the date last above written until the termination of this Bond as provided for hereinafter. It is expressly understood and agreed that the above sum represents the total aggregate liability under this Bond on all work performed under Agreements issued as aforesaid but not properly released by said Department.

This Bond may be terminated by the SURETY following the giving of written notice of intention to terminate by certified mail to the Utilities Engineer, Department of Transportation, Bureau of Highways, of the State of Tennessee, Nashville, Tennessee, 37219, and said termination will become effective thirty (30) days after receipt of said notice. Proper termination notice notwithstanding, PRINCIPAL and SURETY will remain bound to the State of Tennessee under the terms hereinabove set out for the performance of any projects, with City County (strike one) of _____, Tennessee, for which Application and Utility Use and Occupancy Agreements were entered into between the date last above written and said date of termination, until proper release is received from the Department of Transportation, Bureau of Highways, of the State of Tennessee for each of said projects.

NOW, THEREFORE, the PRINCIPAL and SURETY assume all obligations and liabilities as set forth above.

Signed, sealed and dated this ____ day of _____, 19____.

Surety Company Bond No. _____

Mailing Address of Surety Company

_____
_____

Name and Address of Agency Writing Bond

_____
_____
_____

_____
PRINCIPAL

BY _____

TITLE _____

_____
SURETY

BY _____

(A copy of the Power of Attorney properly executed by the company authorizing the agent signing above to bind the company as SURETY on this Bond must be attached hereto.)

Figure 1: Examples of Standard Performance Bonds

Permits

Most highway and street departments require a permit for utility contractors allowing them to make roadway cuts. The permit procedures vary greatly with the agencies consulted.

Permit costs in the states consulted seem to range from no charge to $40. States with no charge permits usually bill the utility contractor separately for inspection services. The permit cost is usually charged per 500 feet of road. Therefore, under the flat 40 dollar system, a utility trench 1000 feet long would cost $80.00. The 40-dollar permit fee usually takes care of inspection services. A combination of both methods seems well adapted for city use. A small 5 to 10 dollar handling fee and a later bill for the amount of inspection services performed is recommended. The amount charged should be stated in with the procedures and specifications. The cost for inspection should be charged per trip and not per hour. A fair charge would be $10 to $15 per visit.

APPENDIX 2A

INDIANA STATE HIGHWAY DEPARTMENT PERMIT FORM

State Form 41769

State of Indiana
Department of Highways
PERMIT

Type of Permit:

☐ Cut Road ☐ Pole Line ☐ Bridge Attach. ☐ Miscellaneous

District _____ Sub-District _____ Telephone ( ) _____

Project Location _____

Project Description _____

Project Purpose _____

Bond Required: ☐ Yes, Penal Sum $_____, Bond Number _____ ☐ No

PERMIT FEE: $_____ Check or Bank Draft Payable to "Indiana Department of Highways".

Special Provisions:

THE APPLICANT AGREES TO INDEMNIFY, DEFEND, EXCULPATE, AND HOLD HARMLESS THE STATE OF INDIANA, ITS OFFICIALS AND EMPLOYEES FROM ANY LIABILITY DUE TO LOSS, DAMAGE, INJURIES, OR OTHER CASUALTIES OF WHATSOEVER KIND, OR BY WHOMSOEVER CAUSED, TO THE PERSON OR PROPERTY OF ANYONE ON OR OFF THE RIGHT OF WAY ARISING OUT OF, OR RESULTING FROM THE ISSUANCE OF THIS PERMIT OR THE WORK CONNECTED THEREWITH, OR FROM THE INSTALLATION, EXISTENCE, USE, MAINTENANCE, CONDITION, REPAIR, ALTERATION, OR REMOVAL OF ANY EQUIPMENT OR MATERIAL, WHETHER DUE IN WHOLE OR IN PART TO THE NEGLIGENT ACTS OR OMISSIONS (1) OF THE STATE, ITS OFFICIALS, AGENTS, OR EMPLOYEES, OR (2) OF THE APPLICANT, HIS AGENTS OR EMPLOYEES, OR OTHER PERSONS ENGAGED IN THE PERFORMANCE OF THE WORK, OR (3) THE JOINT NEGLIGENCE OF ANY OF THEM, INCLUDING ANY CLAIMS ARISING OUT OF THE WORKMEN'S COMPENSATION ACT OR ANY OTHER LAW, ORDINANCE, ORDER, OR DECREE. THE APPLICANT ALSO AGREES TO PAY ALL REASONABLE EXPENSES AND ATTORNEYS FEES INCURRED BY OR IMPOSED ON THE STATE IN CONNECTION HEREWITH IN THE EVENT THAT THE APPLICANT SHALL DEFAULT UNDER THE PROVISIONS OF THIS PARAGRAPH.

APPLICATION NUMBER
ROAD NUMBER
SECTION
EXPIRATION DATE
ISSUE DATE
PERMIT NUMBER

INSPECTOR

DISTRICT PERMIT ENGINEER

DISTRICT ENGINEER

PERMIT APPLICANT SIGNATURE

NAME OF COMPANY OR ORGANIZATION

POST OFFICE ADDRESS

( ) TELEPHONE

Personally appeared before me

as applicant this ____ day of _____, 19____

Witness my hand and _____ seal the said named date. My Commission expires _____, 19____

NOTARY SIGNATURE

NOTARY PRINTED

5 Copies – Submit all copies
White – Division of Maintenance
Green – Surety
Canary – Sub-District
Pink – Applicant
Gold – District

State of Indiana
Department of Highways
GENERAL PROVISIONS

1. All work described in the permit shall be subject to the inspection of the Department of Highways and the permittee shall adjust or stop operations upon direction of any police officer or authorized Department of Highways employee.

2. The permit may be revoked at any time by the Department of Highways for non-compliance with any and/or all provisions of said permit.

3. The permittee shall notify the Department of Highways Sub-District five (5) working days preceding the beginning of any work activity.

4. The permittee shall notify the Department of Highways Sub-District that the work is complete and this notice is to be provided within seven (7) days from completion of all work on this permit.

5. The permittee shall have the permit complete with drawings and special provisions in their possession during work operations and will show said permit, on demand, to any police officer or authorized Department of Highways employee.

6. The permittee shall pay the Department of Highways for any inspection costs where it is necessary to assign a Department of Highways employee to inspect the work. The applicant shall immediately reimburse the State upon receipt of an itemized statement.

7. The permit is valid through the stated expiration date. If work is not completed within the allotted time, the permit is automatically cancelled unless an extension is requested prior to the expiration date and said request is approved by the Department of Highways. If a permit is cancelled, a new application must be submitted and approved before the proposed work can be accomplished.

8. The permittee shall erect and maintain all necessary signs, barricades, detour signs, and warning devices required to safely direct traffic over or around the part of the highway where permitted operations are to be done so long as the work does not interfere with traffic, in accordance with Section "D" of the Indiana Manual of Uniform Traffic Control Devices.

9. All construction and materials used within the highway right-of-way must conform to the current Department of Highways "Standard Specifications" with the permittee being considered in the same status as the contractor.

10. Any operations authorized by the permit shall not interfere with any existing structure on the Department of Highways right-of-way without specific permission in writing from the Department of Highways. In the event that any buildings,railings, traffic control devices, or other structures are damaged, said cost of the removal and/or damage shall be borne by the permittee.

11. This permit does not apply to any State roads or bridges that are closed for construction purposes, or to any county roads or city streets.

12. Approval of the permit application shall be subject to the permittee obtaining all necessary authorizations from local authorities and complying with all applicable laws. The issuance of the permit shall in no way imply Department of Highways approval of, or be intended to influence any action pending before a local board, commission, or agency.

13. The permitted operations shall not be performed on Saturdays, Sundays, or during the period beginning at 12:00 Noon on the last weekday (Monday through Friday) preceding and continuing until Sunrise on the day following: New Years Day, Memorial Day, Independence Day, Labor Day, Thanksgiving, and Christmas.

14. In accordance with the notice requirements of Indiana Code 4-22-1-25, any objection to the conditions and provisions of an approved permit must be submitted in writing to the Department of Highways within fifteen (15) days from the issue date.

Figure 2: Indiana State Highway Department Permit Form

States require utility contractors to submit a copy of their work plans for street cuts. The states review the plans to ensure standards and specifications are being met. Cities usually do not require the submittal of plans. They only require that the pavement be replaced in "as good or better than original condition." This seems reasonable because cities do not have the work force that the states have to check all the permit plans. This is where specifications are important. They will be discussed in more detail in the next section.

Utility contractors have time schedules as well as any business. Therefore, the ability to be able to forecast a project's duration is important, including the time needed to obtain a permit. The time duration for permit approval should be well-defined for the contractors. Time durations for cities or counties will be much less than for states since plans usually do not have to be reviewed. A complete schedule by work days would be helpful for the utility contractors. Procedures for emergency cuts will be discussed later in this chapter.

CUT ROAD (Major)

- 2 -

Step

1. (5WD) All applications are initially received at the District Office over the counter or by mail. The District is to verify all pertinent existing field conditions as described by the application and shown on the plans. The application package is reviewed for completeness and compliance with standards. It is forwarded to the Permit Department with recommendations.

2. (2WD) The Permit Department is to initially perform a preliminary review of the application for completeness and compliance with standards.

3A. (3WD) The Permit Department forwards by memorandum to the Traffic Division the following information:

a) Permit Form (SF 41769)
b) Plans
c) Traffic control plans
d) Means and sequence of performing work
e) Copy of memorandum from the District

The Traffic Division is to review all information provided related to but not limited to:

a) Traffic Control at the time of work activity
b) Effects on State Highway traffic equipment
c) Conflicts with future traffic construction projects
d) Recommend unique special provisions

The Traffic Division is to forward their recommendations either by note on the Permit Department memorandum for minor comments or by separate memorandum for more complicated responses to the Permit Department.

3B. (3.5WD) The Permit Department forwards by memorandum to the Utilities-Railroad Section the following information:

a) Permit Form (SF 41769)
b) Plans
c) Letter of explanation from the applicant
d) Copy of memorandum from the District

The Utilities - Railroad Section is to review all information provided related to but not limited to:

a) Compliance with standards for utility occupancy of State Highway right-of-way.
b) Acceptable construction methods for utility work on right-of-way.
c) Effects on State Highway facilities in work area.
d) Recommend unique special provisions.

The Utilities - Railroad Section is to forward their recommendations either by note on the Permit Department memorandum for minor comments or by separate memorandum for more complicated responses to the Permit Department.

3C. (7WD) If the permit application involves grading and/or drainage work that will affect the State Highway right-of-way, the Permit Department forwards by memorandum to Road Design the following information:

a) Permit Form (SF 41769)
b) Drainage including all drainage structures and calculations
c) Grading site plans

Road Design is to review all information provided related to but not limited to:

a) Effects of work site activity on drainage, erosion control, etc.
b) Restoration of vegetation and fences
c) Review miscellaneous items such as curbs, sidewalks, etc.
d) Recommend unique special provisions

Road Design is to forward their recommendations either by note on the Permit Department memorandum for minor comments or by separate memorandum for more complicated responses to the Permit Department.

4. (2WD) The Permit Department collects and coordinates all Departments and District findings. A memorandum to the Assistant Chief, Division of Maintenance is prepared and forwarded containing the combined recommendations, the permit application form, the special provisions, the plans, and other information.

5. (2WD) The Assistant Chief, Division of Maintenance makes a final determination and the memorandum with instructions noted is returned to the Permit Department for final processing. If the permit is approved, the Assistant Chief signs the permit form.

6A. (2WD) Approved permits are assigned a permit number, start date, expiration date, and special provisions are attached. The Permit Department distributes the copies of the issued permit to the District, the applicant, the Surety, and to file.

6B. (2WD) Disapproved permits are assigned a denial number. A letter to the applicant with copies to the Surety and District is prepared for the Assistant Chief, Division of Maintenance signature. The letter states that the permit application is disapproved and the reason(s) for the denial.

Total:
(16.5 WD)
(20 WD for grading and drainage permit)

Excluding Mail time

Figure 3: ISHD Permit Review Time Table

Specifications

The phrase "replaced in as good or better than original condition" is no substitute for an up-to-date set of specifications. Specifications are essential to quality street cut repairs. All states consulted have specifications, while very few cities and counties do. The specifications should be used by inspectors during their inspection of the repair. Specifications help to ensure that the essential features for proper street repair are upheld. The features are:

- Integrity of the pavement structure, shoulders, and embankment slope
- Restoration of the structural integrity of the entrenched roadbed
- Security of the pipe against deformation likely to cause leakage
- Assurance against the trench becoming a drainage channel
- Assurance against drainage being blocked by the backfill

These are all important points which the specifications and inspectors are there to protect.

Example of Material Specifications

(Note: All numbers refer to *Indiana State Highway Standard Specifications-1978*)

Hot Asphalt Emulsion (AE) Pavement (Section 402)

The materials shall conform to the requirements set out in the following referenced subsections.

402.02 Aggregates.
402.03 Bituminous material.
402.04 Preparation of mixtures.
Composition Limits for:
Base No. 4, No. 5
Binder No. 8, No. 9
Surface No. 11-III, Type IV

The base, binder and surface mixtures specified above, shall be made using coarse aggregate in combination with fine aggregate and a percent of bitumen, as specified in the "Job-Mix Formula" of the "Indiana State Highway Standard Specifications - 1978" (Subsection 402.04-b).

Hot Asphalt Concrete Pavement (Section 403)

The materials shall conform to the requirements of the subsections referenced below.

403.02 Aggregates.
403.03 Bituminous material.
403.04 Preparation of mixtures.
Composition Limits for:
Base No. 4, No. 5
Binder No. 8, No. 9
Surface No. 11-B

The base, binder, and surface mixtures specified before, shall be made using coarse aggregate in combination with fine aggregate and a percent of bitumen, as

specified in the "Job-Mix Formula" of the "Indiana State Highway Standard Specifications - 1978" (Subsection 403.04-b).

Cold Mixed Bituminous Pavement (Section 406)

Materials shall conform to the subsections listed below.

406.02 Aggregates and Bituminous material.

Coarse Aggregates:

For Base Mixtures (open graded)	Subsection 903.02
For Base Mixtures (dense graded)	Subsection 903.02
For Binder Mixtures	Subsection 903.02
For Surface Mixtures	Subsection 903.02
Natural Sand Surface	Subsection 903.01
Bituminous Material for Mixture.	
For Stockpiling, Asphalt Emulsion AE - 150	Subsection 902.04

Prime Coat (Section 408)

Materials should conform to the requirements of the subsections listed below.

408.02 Bituminous material.

Cut-Back Asphalt, MC - 70	Subsection 902.03
Asphalt Emulsion, AE - P	Subsection 902.04

408.03 Cover Aggregate.

Coarse Aggregate	Subsection 903.02
Fine Aggregate	Subsection 903.0l

Tack Coat (Section 409)

The type and grade of bituminous material shall be as set out and referenced below, or as specified.

409.02 Bituminous material.

Asphalt Emulsion, AE - T	Subsection 902.04
Cut-Back Asphalt, RC - 70	Subsection 902.03

Backfill ("B" Borrow) (Section 211)

Structure backfill material shall conform to the requirements set out in Subsection 211.02 of the "Indiana State Highway Standard Specifications - 1978."

Some utilities may prefer to use alternate specifications. It is a good policy to let the utility use its own specifications, meeting minimum standards. The specifications should be reviewed by the city or county engineer. It is important to maintain a good working relationship between the engineer and the utility.

Items which should be included in a good set of procedures are:

- Bonds
- Permits - with clause for emergency cuts
- Traffic control procedures
- Required materials
- How to make a cut
    a. Pavement cut
    b. Backfill and density check
    c. Pavement restoration
- Long term responsibility for the cut
- Alternatives to street cuts
- Penalties for non-compliance

Inspection Procedures

The inspection phase of street cuts is important to the quality of the finished product. The street cut restoration done within any Indiana city or county will be no better than the inspection effort put forth by the Permit Office and other city agencies. In addition, the Permit Office must have enforcement mechanisms available for dealing with contractors who do not obtain permits or who perform work in violation of city codes, specifications or policies. Therefore, all street cuts should be inspected. It is recognized that most cities and counties do not have the manpower to furnish a thorough inspection program. Somewhere in the policies and procedure it should be stated:

> Any inspection by the city or county shall in no way relieve the utility owner of any duty or responsibility to the general public nor shall such services and/or control by the city or county relieve the utility owner from any liability for loss, damage or injury to persons or adjacent properties. [16]

If large projects require constant surveillance, then an inspector should be assigned to the project.

The inspector should make sure all repairs are made in accordance with stated specifications and codes. Failure to install facilities in accordance with these policies should result in immediate action. The inspector should advise the utility contractor to suspend further construction activities at that site until corrective measures have been made to the satisfaction of the city or county. [16]

A good policy is to have the utility contractor call the Engineer's office 24 hours before the cut is to be made. This gives the city or county time to schedule an inspector to the repair. Some cities and counties require a call when the firm is ready to backfill. This may impede the work, but it should greatly increase the quality of the street repairs. [4]

The immediate inspection is important, but continual surveillance for settlement or failure can also improve quality. Procedures for failure or settlement will be discussed in a later section. One idea imposed by some states on utilities is paint markings on the repaired surface. The Indiana State Highway Department uses the national color code listed below.

1) Safety Yellow	Gas Company
2) Safety Orange	Telephone Company
3) Safety Blue	Water Company
4) Safety Red	Electric Company
5) Safety Green	Sanitary District
6) Safety Gray	Oil Line
7) Safety White	Steam Line
8) Safety Pink	Television Company

State Form 41820

State of Indiana
Department of Highways
PERMIT INSPECTION REPORT AND COST SUMMARY

Type of Permit:
☐ Oversize Overweight ☐ Driveway ☐ Cut Road ☐ Pole Line ☐ Bridge Attachment ☐ Misc. _____

District _____ Sub-District _____

To: Chief, Division of Maintenance
and Engineer of Permits

This is to inform you the work in the referenced permit has been thoroughly inspected and found to be as checked in the box below.

Date of Inspection: _____

☐ COMPLIES – (The work has been completed according to all provisions outlined in the permit and final approval is granted.)

Explain: _____

Release Surety on Bond Number: _____

☐ DOES NOT COMPLY – (The applicant has been informed to make the following corrections to comply with the permit provisions.)

Explain: _____

Notify Surety on Bond Number: _____

☐ CANCEL – Explain: _____

Release Surety on Bond Number: _____

INSPECTOR

DISTRICT ENGINEER

Name of Applicant

Address

5 Copies
White – Division of Maintenance
Green – Surety
Canary – Sub-District
Pink – Applicant
Gold – District

☐ No inspection costs are to be charged.

☐ Inspection costs are shown on reverse side of this report.

APPLICATION NUMBER
ROAD NUMBER
SECTION
COMPLIANCE DATE
ISSUE DATE
PERMIT NUMBER

The following is an itemized cost summary for services performed on the referenced permit.

STATE EMPLOYEE

Date	Hours	Hourly Rate	Labor	Overhead	Amount

Sub-Total: _____

VEHICLE

Date	Miles	Rate	Amount

Sub-Total: _____

OTHER

Date	Unit	Number of Units	Rate	Amount

Sub-Total: _____

Total: _____

Figure 4: ISHD Inspection Form

The above colors are used to paint a 2" x 4" rectangular patch on the curb side to identify the cut (or a 3" diameter disc at the leading edge). This paint should be maintained by the utility for one year after the repair is made. This way the local agency can immediately tell which utility is responsible for the settlement or failure. Below are locations where the paint can be purchased.

Perfection Paint & Color Company, Inc.
715 East Maryland Street
Indianapolis, IN 46202
Phone: (317) 632-4311

Perfection carries all the colors in Aerosol spray cans with inverted tips. The paint is $2.95/can and must be bought by the 12 can case for $35.40.

Fox Valley Marking Systems, Inc.
172 South Northwest Highway
Dept. 968
Cary, IL 60013
Phone: 800-323-4770 (Toll Free)

Fox Valley carries all the colors except gray and pink in Aerosol spray cans with inverted tips. The paint is $2.17/can and must be bought by the 12 can case for $26.00.

Local paint dealers should also be consulted to see if they can obtain these specialty items. [4]

Emergency Procedures

Sometimes emergencies arise that demand repairs immediately, especially with gas and water utilities. which demand repairs immediately. Therefore, the city or county engineer should have set procedures with which utilities are familiar for handling these situations. A good policy, which seems to work well for several cities, counties and states, is a requirement that utilities notify the permit office by phone. At night, there should be a designated person to handle the call so that the utility can be issued a permit number. The permit number allows the company to begin work immediately. The utility must come into the Permit Office the next day to complete the permit application and pay the fee.

Cuts to be made in (State Highways or State Routes) (in outside) Cities by Utilities.
Date Work Started . . . . . .
Address . . . . . .
This is an emergency cut because. . . . . .
. . . . . .
Regular Application Form M-173 and check will be filed at State Highway Sub-District Office not later than . . . . . .
Name of Utility . . . . . .

By . . . . . Phone No. . . . . .

Address . . . . . .
*Emergency cuts are defined as these to repair leaks or any other work that has to be done immediately to protect life or property.

Date . . . . . .

Verbal permission given by . . . . . .

Time . . . . . .

Figure 5: ISHD Preliminary Application for Emergency Cuts

Penalties for Non-Compliance

There are generally good relations between the local governments and utility companies. The most effective enforcement mechanism for a contractor caught doing work without a proper permit is the issuance of an ordinance violation ticket by an inspector or the police department. Consideration should be given to raising the minimum fines for such code and ordinance violations. Forwarding copies of letters detailing problems relating to a particular company to the Better Business Bureau has proven to be an effective mechanism for obtaining compliance with city codes, requirements, procedures, and policies. [4]

When settlement of a street cut occurs, an established policy for handling this kind of situation is important. If the area to be rapaired does not endanger the public, the recommended action is to notify the proper utility to make the repairs. A specific time period should be designated, such as two weeks. If the repairs are not made within this period, city or county forces should make the repairs and bill the utility. The utility contractor should not be issued any more permits until its current bill is paid. If the utility contractor refuses, the bonding company should be notified. This policy would not work for utility companies. Limiting access to the right-of-way would only hurt the customers. Therefore, in the case of utility companies, if the initial fine is not paid in two weeks, it should be doubled, or some similar procedure should be followed. The county and city engineers should have an agreement on this policy with utility companies. It should be stressed that good relations and communication with utilities can prevent such situations as the one described above.

Along with the above methods and procedures, several other characteristics of a good street cut program are common to cities and counties. One of the most common procedures is the follow-up inspection. For all street cuts, the follow-up inspection should be done 6 to 12 months after the repair. For individual contractors an additional inspection should be done one to two years later, before the performance bond is released. Good communication between county, city and utility engineers is another common characteristic. Many cities and counties had monthly meetings with all the utilities present to discuss problems or future plans of the city, county or utilities. For example, letting the utilities know well ahead of time about any road construction is important. The utilities need to be able to get their repairs done before road crews start. The improtance of good communication cannot be stressed enough.

TESTING

The only way to ensure quality street cuts is through a thorough program of inspection and testing. This section of the chapter will present the various methods practical for cities and counties to use in testing base material compaction of street cuts. Most cities and counties will not have the manpower to do their own testing. Therefore, one way to develop a program is by calling in a consultant. Several testing firms in the Indianapolis area were consulted for prices. It must be emphasized that every utility repair does not have to be tested. It is recommended that the consultant, if hired, should work four to eight hours per week. The consultants interviewed said the charge for this would be $60/4 hours or $120/8 hours (May 1983). Three tests could be made per hour. This should be plenty of tests for a county or town. The price is reasonable if it helps reduce street cut settlement. Working with local consultants gives the Engineer's office considerable flexibility. The consultant furnishes the equipment and manpower. If funds begin to run low, the testing can be reduced or stopped. [5]

For counties and cities that wish to do their own testing, there are basically two types of tests: destructive and non-destructive The destructive tests disturb already-compacted material. Non-destructive tests can determine density without disturbing the compacted material. The non-destructive tests are preferable, but the cost can be prohibitive. This is especially true of nuclear testing.

Nuclear Gage Monitoring Equipment

- $3400 + 100
- Initial 5-7/person
- $2.75/badge every two weeks

Although the initial cost is high, it is a valuable method because of its speed and accuracy.

Most cities and counties do not have the funds available for modern nuclear testing so several methods are presented. The inexpensive methods recommended are the Sand Cone and the Clegg Impact Tester.

Clegg Meter $1200-$1300
Lafayette Instrument Co.
P. O. Box 5729
Lafayette, IN 47904
Phone: (317) 423-1505

These two tests can be used with state standard base materials to develop standard compaction methods. The Clegg Impact tester can then be used to field check the compaction.

No matter which means is selected, the testing will enable the inspectors to see if the utility contractors are meeting compaction standards. If they are not, penalties must be established. Most utility contractors will not change their procedures until fines are issued. A testing program with penalties for noncompliance should encourage utility contractors to do a better job the first time around. [2]

All the methods presented are valuable for checking the backfill of street repairs. Since cites and counties generally have budget and manpower shortages, the Clegg Impact Tester is recommended. Because it is inexpensive and easy to use, it has an advantage over the other methods.

TRAFFIC CONTROL FOR STREET CUTS

Traffic control for street cut repairs is very important. The public is no longer tolerant of unsafe practices of county, city and utility forces. Motorists involved in accidents due to poor traffic control at a street cut repair, are likely to sue the negligent party. Counties and cities do not have the funds to handle legal fees and penalties for unsafe practices. Therefore, counties and cities must take extra precautions to be sure the roadway is safe at all times. The main reason for adequate traffic control should be safety for the workers and motorists instead of avoiding costly legal expenses.

There are basically three important components of traffic control:

- To get the work done
- To keep the traffic moving with minimum disruption
- To maintain safety

Public agencies with authority over the roadway are primarily responsible for seeing that the above criteria are met. They should establish and maintain current, up-to-date specifications. Utility Contractors must realize that any specifications used serve only as minimum standards for the most common situations. This is because it is not practical to develop detailed standards to meet all situations that may conceivably arise. Anything other than standard procedures can be confusing to the public. [11]

The public agency should have thorough inspection procedures to ensure that the utility contractors comply with established specifications. The Indiana State Highway Commission has developed an *Indiana Manual on Uniform Traffic Control Devices.* The 1981 manual has a complete section (Part VI) devoted to construction and maintenance which covers "Traffic Controls for Street and Highway Construction and Maintenance Operations". Most cities and counties have developed their specifications using this as a guide and require their specifications be used in conjunction with the manual.

Once the specifications have been established, utilities doing the work or having the work done share the safety responsibility with the public agency. At the job site, once the work begins, each worker is responsible for his/her safety, other workers' safety and safety to the motorist. The foreman takes direct responsibility for all workers' safety and the safety of the motorist. Safety is achieved by advance warning for motorists, visibility, protection of the work area and clear directions to traffic. [15]

HERPICC is constantly updating its library of material on safety. Presently, there are three slide tape presentations on Traffic Control at the job site. They are:

- No. 1200 Selection and Use of Traffic Control Devices
- No. 1300 Safety: The Mark of a Professional I
- No. 1400 Safety: The Mark of a Professional II

These slide tape presentations can be obtained by calling HERPICC at 800-428-7639, toll-free. The presentations can be shown to local crews during lunch or on a rainy day.

Traffic control and safety at street cut repairs are essential for protecting the workers and the motorist. This seems to be the area where most utilities or contractors hired by utilties are negligent. It is hard to say if the utility, the public agency or the workers are at fault. Therefore, it is important that the public agency take the initiative for traffic control and safety by establishing a well-defined program of specifications and inspection.

METHODS OF COMPACTION

In counties and cities street repairs are usually backfilled with the excavated material. Granular material should be used if possible, except in clay soils. If granular material was used in a clay soil, the utility trench may become a drainage channel. Therefore, granular material is not always the best backfill. Granular backfills are also more expensive than the excavated material. The excavated material can be used for backfill if the boulders (larger than three inch diameter) are removed and are compacted to its original density. Also, after excavation and during the actual repair of the utility, care should be taken to protect the fill from moisture loss. This can be accomplished by covering the material with a tarpaulin. During hot dry weather the material should be lightly sprinkled every 30-40 minutes. Counties and cities must keep close control on utility contractors if excavated material is used for backfill.

Compaction and Stabilization Methods

Once the inspector or utility contractor at the repair site determines that the excavated material is unsuitable for fill, he must make several decisions. Should the material be replaced or treated (with cement, lime or bitumen) to produce an adequate fill? A common fill used to replace poor material in Indiana is the coarse aggregate 53-B (Indiana Department of Highways' classification). Used with the right compaction methods, this material can produce an inexpensive quality fill. Compaction of coarse aggregates will be discussed later.

One alternative to replacing the fill material, previously mentioned, is using cement, lime or bitumen to improve the soil characteristics. These substances can be fairly expensive when used over large areas. The majority of street cut repairs are only about 25 square feet in area. Using these materials should produce fewer repair failures. Failures mean the utility contractor must return to the site and redo the repair or patch the road. Therefore, the use of these materials could be economical for this size of street cut repair.

For granular backfill there are several means of compaction. Fine aggregates (sand) can be compacted or stabilized by mechanical compactors, saturation and chemical means. When mechanical compaction is used, the size of cut may determine which mechanical compactor is selected. For large open cuts, some type of vibratory plate compactor should be selected. For smaller excavations, a smaller compactor like the Bomag Soil Tamper T50 (118 lbs) or the Stomper VR-15 (135 lbs) is satisfactory. Any type of compactor similar to these could be used. These are the ones used by the Indiana State Highway Department in their *Pothole Repair Study.* Saturation is the most common method for bringing sand to its proper relative compaction. Saturation is quick and easy, but should not be used when the repair is surrounded by a soil with a high percentage of clay. Local ready-mix suppliers can deliver a slurry sand mix. This is just a saturated sand which will flow around utilities and need no further compaction. Local suppliers consulted sell this material for $12.50/ton. Portland cement is the chemical

means of stabilizing a fine aggregate backfill. [12]

Due to the expense of portland cement, mechanical and saturation are the most common means used to reach the specified relative compaction of fine aggregates.

For coarse aggregates, the most widely used method of compaction is mechanical compaction. Some moisture is added to lubricate the particles. The size of the cut, as with the fine aggregates, determines size of compactor to be used. For large areas a vibratory plate, Bomag T70 (175 lbs) or Wacker GVR 2201 (105 lbs), would be selected. For smaller areas the Bomag T50 (118 lbs), Stomper VR-15 (135 lbs) or similar machine should be used.

As discussed earlier, when soil is used for backfill, the material should be compacted in six inch loose lifts. Sprinkling the backfill before each compaction should help to achieve a higher density than if compacted dry. The compactors mentioned earlier should also be used on soils to achieve adequate compaction. Soils can also be stabilized by the chemical means mentioned earlier.

Another method similar to the chemical stabilization methods is a controlled density fill. Controlled density fill (CDF) can be made to densities of 90 to 135 pounds per cubic foot and compressive strengths can be produced from low to 1600 psi. Local site materials are selected for use in the mix. Controlled density fills will flow around structures and no special finishing is needed. The mix needs to be protected from loads for four hours. CDF can be easily excavated without caving in or running. The controlled density mix is available through local ready mix concrete suppliers under a licensing arrangement with:

Brewer & Associates
P. O. Box 7239
Toledo, Ohio 43615

The mix is composed of cement, fly ash and other locally available materials. Controlled density fills are best used when a large quantity of backfill material is needed. It would not be practical to call a concrete mixer out for a small street cut repair. [3]

- CDF needs no tamping labor.
- CDF can be made to any consistency.
- CDF flows readily in and around pipes.
- CDF can easily be made to meet density and/or strength specifications.
- CDF can be applied without forms or support.
- CDF can be worked on within hours under normal conditions.
- CDF can be cut or trenched without caving in or running. [3]

Conclusion

The actual compaction and consolidation of the backfill and surface material is extremely important in order to produce a long lasting quality street cut. Cities and counties should consider setting up an inspection and testing program. This was discussed in the testing chapter, but is re-emphasized here.

Methods for repairing street cuts are presented in the Foreman manual. These are presented as a guide for cities and counties to up-date or develop their own specifications. It must be stressed that clear communication to the utility contractors of their obligations, when they make road cuts, is essential. No fines should be issued until the utilities are informed what is required of them. A good policy, which the Indianapolis Department of Transportation instated is: before a permit is issued, the utility or contractor, buying the permit, must purchase or show proof of ownership of a *Right-of-Way Activity Manual.* The *Right-of-Way Activity Manual* contains all the specifications and states all the liabilities of utilities or contractors working in the right-of-way. A *Right-of-Way Activity Manual* can be purchased by mailing $10.00 (May 1983) to:

DOT Permit Office
Room 2760 City-County Building
Indianapolis, IN 46204

ALTERNATIVES TO UTILITY CUTS

Utility pipes, beneath pavements, are subjected to various loads which cause them to crack, break and leak. Dynamic loads are constantly being applied to them through the base material by traffic. Sometimes breaks are produced by differential settlements caused by a wetting up or a drying out of the subsoil. People notice the street cuts immediately after a road is resurfaced. In some situations, this is the time when leaks begin. The old pipes are subjected to the heavy vibratory loads used to compact the bituminous surface. Most cities and counties refuse to issue street cut permits for a period of two to five years after the road is resurfaced, unless an emergency arises. There are many other reasons for requiring alternative methods to street cuts. Heavy traffic is one of these reasons.

Utility contractors have had to find other means to replace damaged pipes since street cuts were not allowed on resurfaced streets. Presently there are three methods of untrenched construction used in Indiana. Old leaky pipes can be replaced by jacking, coring or boring. All three methods are being used and provide utility contractors with valuable alternatives to street cuts. Generally utilities call in specialty contractors to handle untrenched construction.

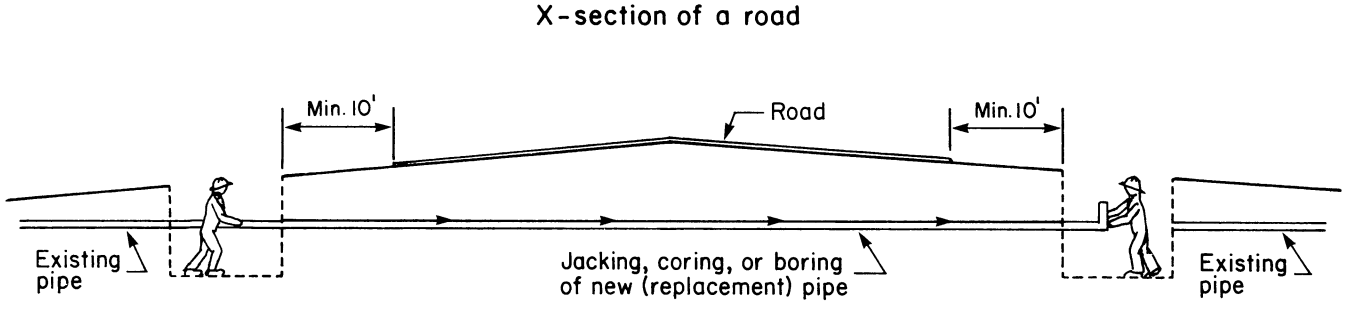

Figure 6: Jacking, Coring or Boring of New Pipe

Jacking is one of the most popular untrenched methods in the state for pipes less than six inches in diameter. A casing or corrosion-resistant carrier must be used. Driving works most effectively in compressible soils. A steady thrust, hammering or vibrating is needed to drive the pipe with a pilot shoe. The city of Alexandria used a backhoe to provide the steady thrust. Driving should not be used for long distances. Long drives may wander far from the desired line and grade. [9,16]

Boring is another popular alternative to street cuts. Large pipes can be jacked through oversize bores, carved progressively ahead of the pipe. The auger should not exceed the outside diameter of the following pipe by more than 1 inch. The spoil is mucked back through the pipe. Line and grade are easy to control. A grout backfill shall be used for pipes more than 12 inches in diameter and for overbreaks, unused holes, or abandoned pipes. [16]

Coring is the third alternative to utility cuts. This method is used mainly when driving becomes too difficult in hard soils. Line and grade are fairly easy to control with coring. A small casing (six inches or less) without a pilot shoe is drilled into the difficult soil. The soil enters the pipe as it advances. Then the core is removed by sluicing, during or after the drilling. [9,17]

More cities and counties are turning to these methods to prevent traffic disruption and eliminate street cut settlements. City and county engineers should keep track of local contractors' and utilities' abilities to do untrenched construction. As stated earlier, untrenched construction is a specialty item that demands special skills.

Quality street cut repairs are possible. In fact, many are being made. But bad repairs are the ones people notice. City and county engineers can, without too much effort, greatly increase the quality of the street repairs in their county or city. After all, the local road user deserves the best smooth riding surface that their tax dollars can provide.

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